



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/549,698	07/14/2006	Masanori Sakai	1592-0178PUS1	9561
2252	7590	10/15/2008		
BIRCH STEWART KOLASCH & BIRCH			EXAMINER	
PO BOX 747			CHEN, KEATH T	
FALLS CHURCH, VA 22040-0747			ART UNIT	PAPER NUMBER
			1792	
		NOTIFICATION DATE	DELIVERY MODE	
		10/15/2008	ELECTRONIC	

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

mailroom@bskb.com

Office Action Summary	Application No. 10/549,698	Applicant(s) SAKAI ET AL.
	Examiner KEATH T. CHEN	Art Unit 1792

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
 - If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
 - Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED. (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(o).

Status

- 1) Responsive to communication(s) filed on 16 July 2008.
- 2a) This action is FINAL. 2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) Claim(s) 1-10 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) Claim(s) _____ is/are allowed.
- 6) Claim(s) 1-10 is/are rejected.
- 7) Claim(s) _____ is/are objected to.
- 8) Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on _____ is/are: a) accepted or b) objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) All b) Some * c) None of:
1. Certified copies of the priority documents have been received.
 2. Certified copies of the priority documents have been received in Application No. _____.
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) Notice of References Cited (PTO-892)
 2) Notice of Draftsperson's Patent Drawing Review (PTO-948)
 3) Information Disclosure Statement(s) (PTO/SB/08)
 Paper No(s)/Mail Date _____
- 4) Interview Summary (PTO-413)
 Paper No(s)/Mail Date _____
- 5) Notice of Informal Patent Application
 6) Other: _____

DETAILED ACTION

Response to Amendment

1. Applicant amendment of the claims, filed on 07/16/2008, in response to the rejection of claims 1-10 in the non-final office action mailed on 04/18/2008, by amending claims 1, 4, and 10 is acknowledged and will be addressed below.

Claim Rejections - 35 USC § 103

The text of those sections of Title 35 U.S. Code not included in this action can be found in a prior Office action.

2. **Claims 1-4 and 5-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hatano (US 5709757, hereafter '757), further in view of Miyazaki et al. (US 5252133, hereafter '133).**

'757 teaches all limitations of:

Claim 1: A substrate processing apparatus (Fig. 3) comprising: a processing chamber (inside the reaction tube #212) which accommodates substrates (W) therein, a heating member (#213) which heats said substrates, at least one controller (#222, MFC is a controller, col. 15, lines 42-43), said controller controlling gas supply (MFC is controlling gas supply) to supply a first gas (#208) to the process chamber through a first supply tube (line between #222 and #220) between the at least one controller and the process chamber and, alternately (capable of alternate supply gases through valves V" and V21-V25, col. 15, lines 44-50), to supply a second gas (any of #209a-d) to the process chamber, independent of the first tube, and a single gas supply member (tube to the left of wafer boat #214) which supplies said first and second gases into said

processing chamber and which has a portion extending to a region whose temperature is equal to or higher than a decomposition temperature of at least one of said two gases (heater is capable be adjusted to any suitable temperature for decomposition of gas), wherein said first and second supply tubes are connected to said gas supply member at a location (near #220, inside the tube #212, both supply tubes are connected to gas supply member through #220) whose temperature is lower (temperature at the bottom is lower than the top of reaction chamber, and the temperature at the bottom of chamber is adjusted by the setting of the heater) than the decomposition temperature of said first gas or said second gas, and said first and second gases are supplied into said processing chamber through said gas supply member.

Claim 9: A substrate processing apparatus comprising a hot wall type processing furnace (Fig. 3 has heater #213 heating on the reactor wall) which includes a processing chamber which accommodates substrates therein, a heating member which is disposed outside of said processing chamber (#213 is outside of #212) and which heats said substrates, at least one controller (#222) for supplying a first gas to the process chamber through a first supply tube (line between #222 and #220) between the at least one controller and the process chamber, and, alternately, supplying a second gas to the process chamber, independent of the first tube, a single gas supply member (tube to the left of wafer boat #214) which supplies said first and second gases into said processing chamber, and which has a portion disposed inside of said heating member (the chamber #212 is inside the heating member #213), wherein said first and second supply tubes are connected to said gas supply member in a region (near #220, inside

Art Unit: 1792

the tube #212, both supply tubes are connected to gas supply member through #220) whose temperature is lower (temperature at the bottom is lower than the top of reaction chamber, and the temperature at the bottom of chamber is adjusted by the setting of the heater) than a temperature in said processing chamber in the vicinity of said substrate or substrates, and said first and second gases are supplied into said processing chamber through said gas supply member.

Claim 4: A substrate processing apparatus having a processing chamber which accommodates substrates therein, and a heating member which heats said substrates (as discussed in claim 1 rejection above), in which at least two gases which react with each other (intended use) are alternately supplied into said processing chamber by a controller (MFC #222, V", and valves V21-V25, together, is capable of control the sequence of gas supply) to form a desired film or films (abstract) on a surface or surfaces of said substrates, comprising: two supply tubes (5 tubes near each V21 to V25) through which said two gases respectively flow independently from each other; and a single gas supply member (tube to the left of wafer boat #214) which supplies said gases into said processing chamber and which has a portion extending to a region whose temperature is equal to or higher than a decomposition temperature of at least one of said two gases, wherein said two supply tubes are connected to said gas supply member at a location whose temperature is lower than the decomposition temperature of said at least one gas, and said two gases are alternately supplied by said controller into said processing chamber through said gas supply member (MFC #222, V", and valves V21-V25, together, is capable of control the sequence of gas supply).

Applicant's claim requirement "two gases which react with each other" is considered intended use in the pending apparatus claims. Further, it has been held that claim language that simply specifies an intended use or field of use for the invention generally will not limit the scope of a claim (Walter, 618 F.2d at 769, 205 USPQ at 409; MPEP 2106). Additionally, in apparatus claims, intended use must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim (In re Casey, 152 USPQ 235 (CCPA 1967); In re Otto, 136 USPQ 458, 459 (CCPA 1963); MPEP2111.02).

'757 does not teach the other limitation of:

Claims 1 and 9: (A second gas ...) through a second supply tube between the at least one controller and the process chamber, said first and second supply tubes are each individually connected to said gas supply member.

Claim 4: Said two supply tubes and said gas supply member are connected to each other in said processing chamber.

'133 is an analogous art in the field of vertically oriented CVD apparatus, particularly in solving the problem of uniformity of deposition or cleaning (col. 2, lines 62-65, and Fig. 7; for '757, col. 1. lines 47-50). '133 criticizes the use of one gas supply tube for the mixing of two raw gases in the low temperature atmosphere resulting unwanted product (col. 1, line 54-61) and teaches the use of one gas inlet tube/single

Art Unit: 1792

gas supply member (Fig. 1, #30') with two independent supply tubes (#221 and #222) connected to each other inside the processing chamber (#10) for the purpose of supplying gas with uniform concentration (col. 2, lines 3-6). Note the temperature inside the chamber is higher than outside the chamber, therefore, avoids the raw gas product formation.

At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to have combined '133 with '757. Specifically, by connecting a two raw gases (needed for the process taught by '133) to two independent supply tubes (#221 and #222) and to a single gas supply member inside the reaction chamber as disclosed in '133 to the apparatus in Fig. 3 of '757 for the purpose of avoiding unwanted product in the gas line and improving the gas uniformity, as taught by '133. The second gas line having obviously, at least a valve, therefore, the limitation of "A second gas ... through a second supply tube between the at least one controller (valve) and the process chamber".

Furthermore, '757 discloses the claimed invention except for connecting both gas supply tubes outside the reaction chamber instead of inside the reaction chamber. It would have been an obvious matter of design choice to connect both gas supply tubes inside the reaction chamber, since it has been held that rearranging parts of an invention only involves routine skill in the art. In re Japikse, 86 USPQ 70.

'757 further teaches the limitations of:

Claim 2: said gas supply member is a nozzle having a plurality of gas injection openings (as indicated in Fig. 3, the feed line, left of #214, has many openings).

Claim 3: a reaction tube (#212) which forms said processing chamber and which can accommodate a plurality of stacked substrates therein (stack of W on #214), wherein said nozzle extends from a lower portion to an upper portion of said reaction tube along a direction in which said substrates are stacked.

Claim 5: a film produced by reaction of said first and second gases is adhered to an inner wall of said gas supply member (a film is capable of forming inside the gas supply member either by choosing the reaction gases or by setting the temperature).

Claim 6: said controller (#222) supplies a cleaning gas (any of #209a-209d, in addition, this is intended use) is supplied into said processing chamber through said gas supply member to carry out a cleaning operation of said processing chamber and a removing operation of said film adhered to said gas supply member.

Applicant's claim requirement "supplies a cleaning gas", the gas identity is considered intended use in the pending apparatus claims. Further, it has been held that claim language that simply specifies an intended use or field of use for the invention generally will not limit the scope of a claim (Walter, 618 F.2d at 769, 205 USPQ at 409; MPEP 2106). Additionally, in apparatus claims, intended use must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim (In re Casey, 152 USPQ 235 (CCPA 1967); In re Otto, 136 USPQ 458, 459 (CCPA 1963); MPEP2111.02).

Claim 7: one of said first gas and said second gas is trimethyl aluminum and the other of said first gas and second gas is ozone, and an aluminum oxide film or films are formed on a surface or surfaces of said substrates.

Applicant's claim requirements "trimethyl aluminum", "ozone", "aluminum oxide" and "substrate" are considered intended use in the pending apparatus claims. Further, it has been held that claim language that simply specifies an intended use or field of use for the invention generally will not limit the scope of a claim (Walter, 618 F.2d at 769, 205 USPQ at 409; MPEP 2106). Additionally, in apparatus claims, intended use must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim (In re Casey, 152 USPQ 235 (CCPA 1967); In re Otto, 136 USPQ 458, 459 (CCPA 1963); MPEP2111.02).

Claim 8: one of said first gas and said second gas is tetrakis (N-ethyl-N-methyl amino) hafnium and the other of said first gas and said second gas is ozone, and a hafnium oxide film or films are formed on a surface or surfaces of said substrates.

Applicant's claim requirements " tetrakis hafnium", "ozone", "hafnium oxide" and "substrate" are considered intended use in the pending apparatus claims. Further, it has been held that claim language that simply specifies an intended use or field of use for the invention generally will not limit the scope of a claim (Walter, 618 F.2d at 769, 205 USPQ at 409; MPEP 2106). Additionally, in apparatus claims, intended use must result in a structural difference between the claimed invention and the prior art in order to

patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim (In re Casey, 152 USPQ 235 (CCPA 1967); In re Otto, 136 USPQ 458, 459 (CCPA 1963); MPEP2111.02).

3. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over '757 and '133, further in view of Raaijmakers et al. (US 20010024387, hereafter '387).

For substantially the same reason as in claim 1 rejection above, '757 and '133 teaches an apparatus which has every limitation of the apparatus, including two supply tubes extending into the process chamber, of in the preamble of claim 10, as discussed above.

'757 does not teach the method of claim 10:

The method comprising the steps of: supplying a first one of said two gases to the single gas supply member through a first one of said two supply tubes for a first period of time; and after said first period of time, alternately supplying a second one of said two gases to the single gas supply member through a second one of said two supply tubes for a second period of time to form a film on said substrate or substrates.

'387 is an analogous art in the field of CVD ([0012], last sentence, and '757, lines 11-16), particularly to overcome the shortcoming of the conventional CVD processes ([0013], lines 3-5). '387 teaches the ALD method of forming film by supplying a first one of said two gases (metal source gas, Fig. 5) for a first period of time (as indicated in the time axis of Fig. 5) to form a film (see, for example, [0045]) on said substrate or

Art Unit: 1792

substrates; and after said first period of time, supplying a second one of said two gases (oxygen source gas) for a second period of time to form a film on said substrate or substrates, for the benefit of "the resultant metal-containing monolayer is desirably self-terminating, such that any excess constituents of the first chemistry do not further react with the monolayer formed by this process" ([0055], lines 8-11). '387 further teaches the use of the same chamber ([0049], for example) for ALD, and to modifying different chamber to ALD processes ([0085]).

At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to have combined '387 with '757 and '133, by applying the process taught by '387 in the apparatus provided by '757 and '133 to execute the processing sequence.

The motivation to combine would have been self-terminating monolayer growth, as taught by '387 ([0055], lines 8-11).

Response to Arguments

Applicant's arguments filed 07/16/2008 have been fully considered but they are not found to be persuasive.

4. In regarding to request to interview, see the middle paragraph of page 6, an telephone interview was conducted on 8/6/2008.
5. In regarding to 35 USC 103(a) rejection of claims 1-9, see the bottom of page 6 to line 6 of page 8, Applicants' argument is that Hatano '757 teaches that cleaning gas

Art Unit: 1792

may be sequentially supplied but does not teach alternate supply of gases and in Miyazaki '133, the two gases must be simultaneously supplied.

This argument is found not persuasive.

First of all, '757 sequential supplying of gases is a clear demonstration of its capability of alternate supply of gases.

Secondly, it is well-known the alternative supplying of gases of ALD is a technique of utilizing a CVD chamber. For example, '387 teaches the use of the same chamber ([0049], for example) for ALD, and to modifying different chamber to ALD processes ([0085]). Note that both '757 and '133 are CVD apparatus. Although '133 described a CVD chamber being used for the conventional CVD processes, the apparatus is intrinsically capable of being utilized in the ALD processes.

6. In regarding to 35 USC 103(a) rejection of claim 10, see the last paragraph of page 8, Applicants' argument is Raaijmakers '387 is for ALD, but '133 requires simultaneously supply of gases.

This argument is found not persuasive for the same reason as discussed above.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within

TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to KEATH T. CHEN whose telephone number is (571)270-1870. The examiner can normally be reached on 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Cleveland can be reached on 571-272-1418. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/K. T. C./
Examiner, Art Unit 1792
/Michael Cleveland/

Supervisory Patent Examiner, Art Unit 1792